

Calibrating the VIMOS Redshift Survey Data

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VIMOS

Cosmic Evolution Survey

c o s m o s

The 2007 ESO Instrument Calibration Workshop – Garching, Jan 2007

VVDS: The VIMOS VLT Deep Survey

- **4 fields**, 2x2 deg² each, ~100Mpc @z~1; 1 deep field ($I_{AB} < 24.0$) + 3 “wide” ones ($I_{AB} < 22.5$)

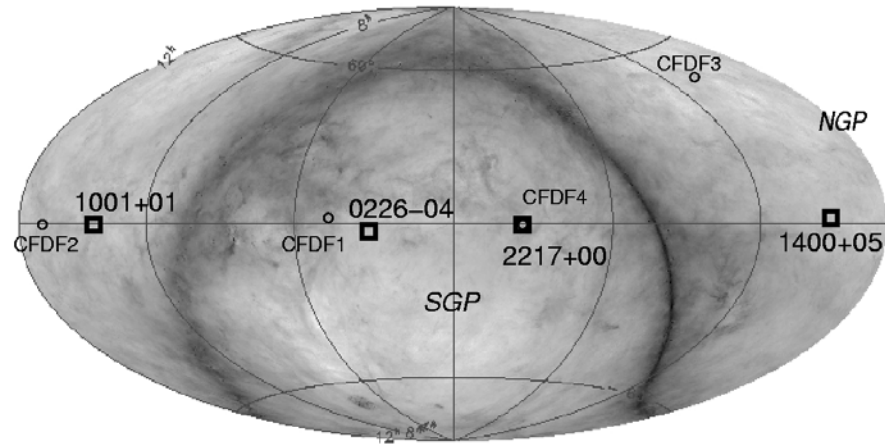
Minimize cosmic variance

- **Magnitude selected sample**

Attempt completeness in luminosity at each redshift: complete census of galaxy population

Away from small color selected samples: relate populations at different redshifts

Price to pay: stars, going inside “redshift desert”, lots of “low” z~0.5-1.2 galaxies



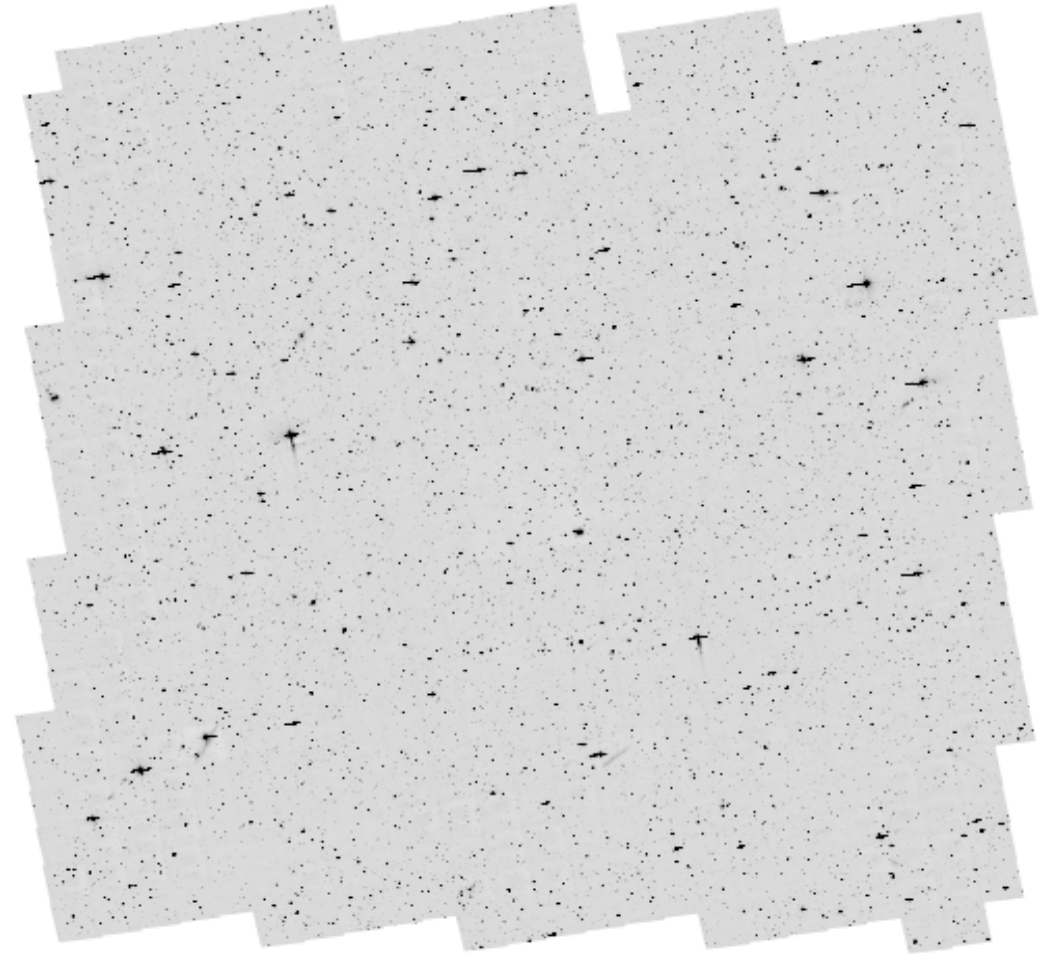
- **150000 redshifts**
0 < z < 5+

- Foster multi-wavelength observations on VVDS fields: VLA, XMM, GALEX, Spitzer



COSMOS: The Cosmic Evolution Survey

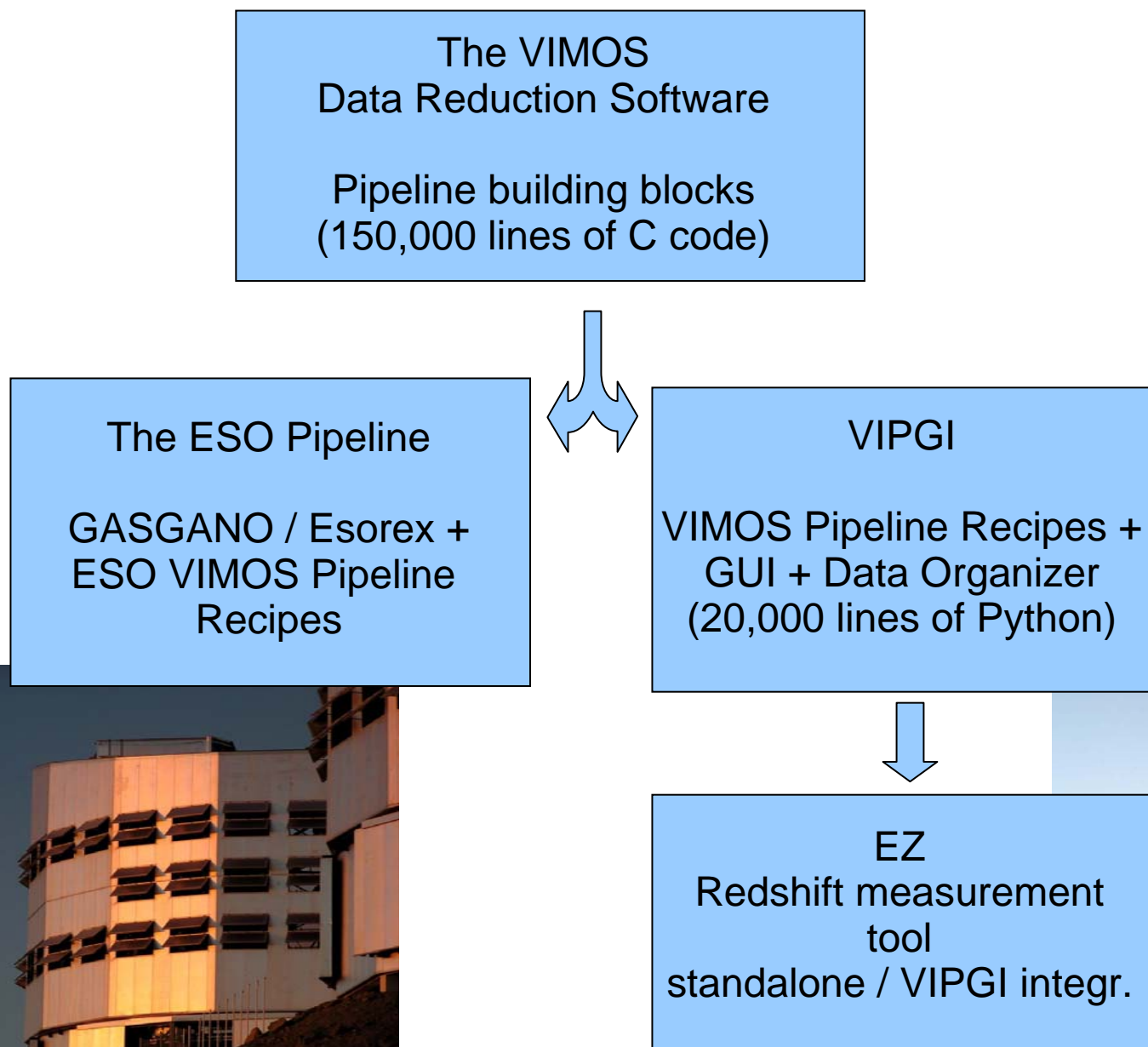
- **1 field**, 1.4x1.4 deg²
- Fully covered with HST-ACS images in I-band (F814W)
590 HST orbits !!!
- Very deep multiband photometry (UbgVrizJHK + 8 narrow/intermediate bands).
Final goal: COSMOS-22 from Subaru + CFHT telescopes
- **multi-wavelength observations**
: VLA, JCMT, ALMA, XMM, Chandra, GALEX, Spitzer



- **Redshift coverage:**
40,000 redshifts at
0 < z < 1.3 + 1.5 < z < 3.0



The VIMOS Data Reduction Pipeline



With contributions from:

- Marco Scodeggio
- Paolo Franzetti
- Bianca Garilli
- Alessandra Zanichelli (in Milano)

- Carlo Izzo
- Ralf Palsa
- Paola Sartoretti (at ESO)

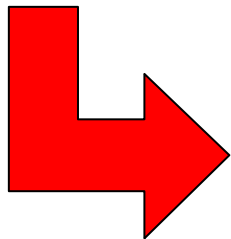
VIPGI: The VIMOS Interactive Pipeline and Graphical Interface

The screenshot displays the VIPGI software interface. At the top, there are tabs for 'Pipeline', 'Organizer Table', and 'Parameter Files', along with a 'Help' button. Below these are several icons representing different functions. The main window is divided into several sections:

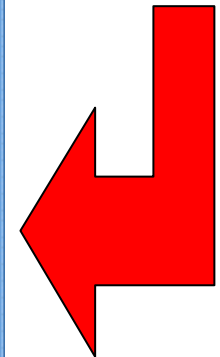
- Ins. Mode:** Set to 'MOS'.
- Actions:** A vertical list of buttons for various tasks: 'Organizer', 'Reduction', 'Browsing', and 'Plotting'. The 'Reduction' tab is active. Below these are buttons for 'Create Master Bias', 'Locate Spectra', 'Create Master Lamp', 'Preliminary Reduction', 'Compute Spectrophotometry', 'Reduce Single Observations', 'Reduce Sequence of Obs.', 'Apply Atm. Correction', and 'Add Manual Detections'.
- Target:** Set to 'Single Set'.
- Data:** A section with tabs for 'Raw Data', 'Q1', 'Q2', 'Q3', 'Q4', and 'All Quadrants'. It contains a list of 'Data Categories' and a 'Single Frames List'.
- Disk Usage:** A horizontal bar chart showing usage for 'All Data [Gb]' with a scale from 0.0 to 84.2.
- Batch List:** Buttons for 'New', 'Add To', and 'View'.

At the bottom, there is a status bar with the text 'Using /hestia/marcos/vimos/vipgi/orgtables/zCosmos.org' and two indicator lights (black and green).

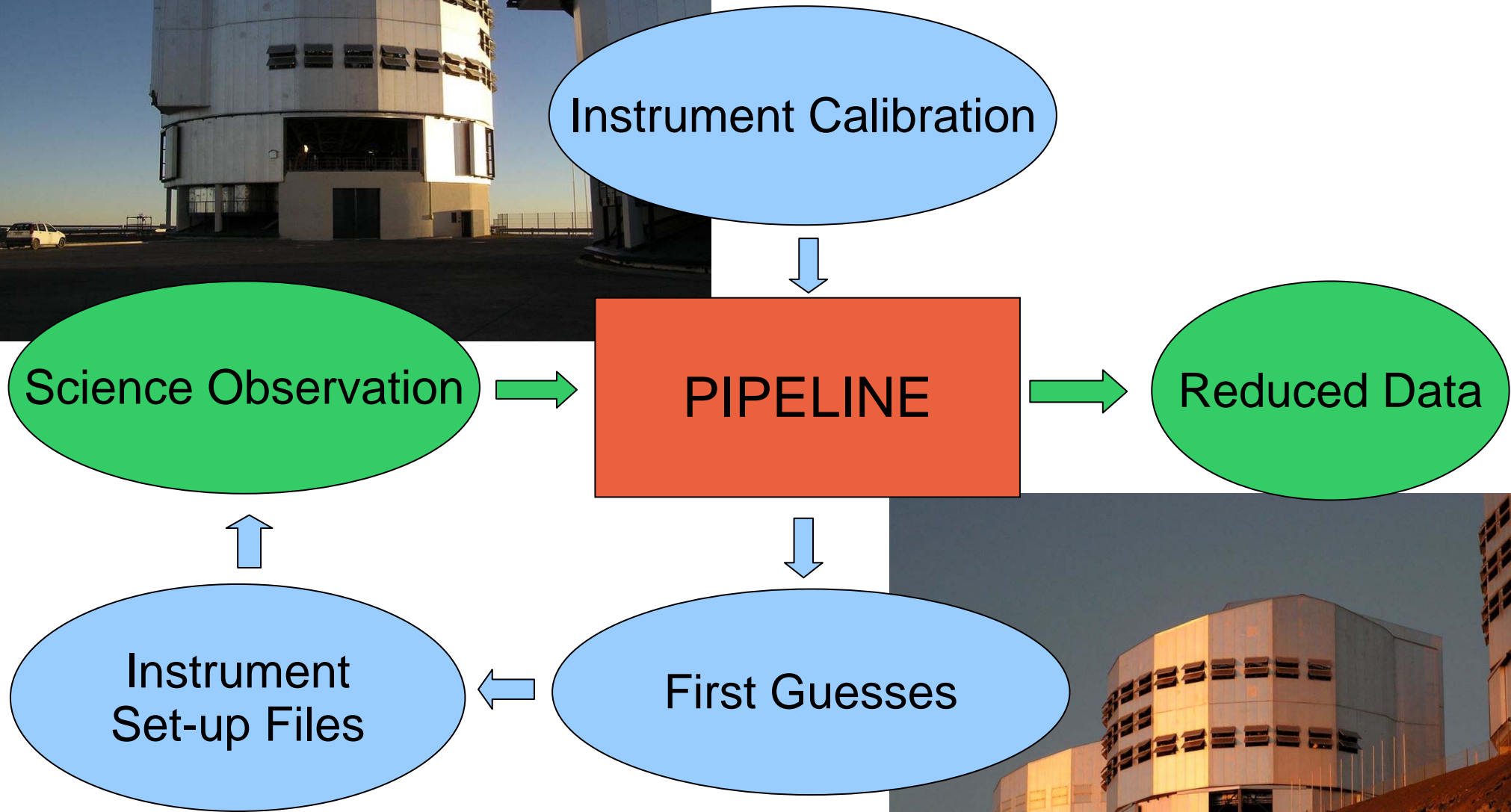
Reduction
Browsing
Plotting
tasks



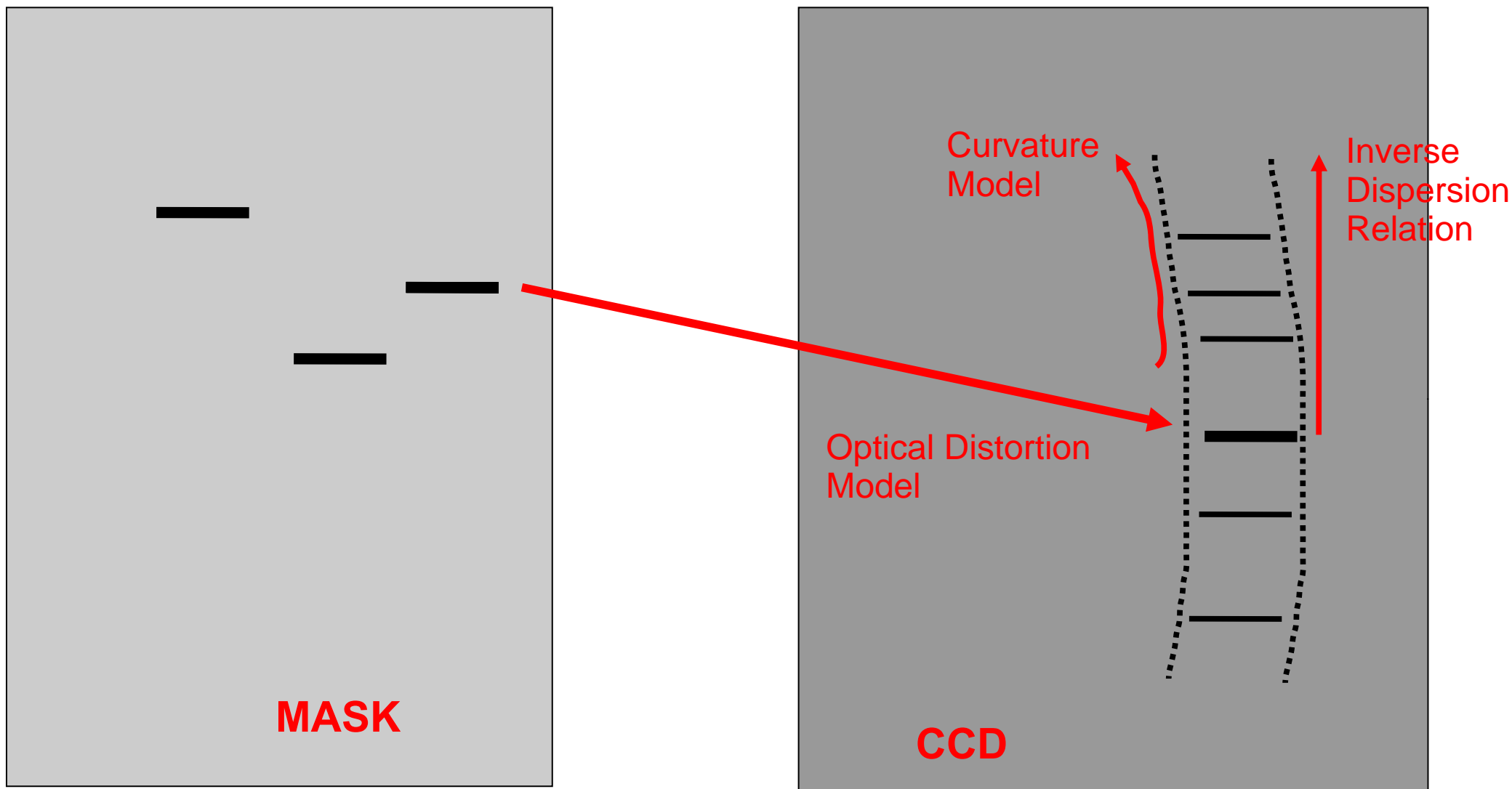
Data
Organizer



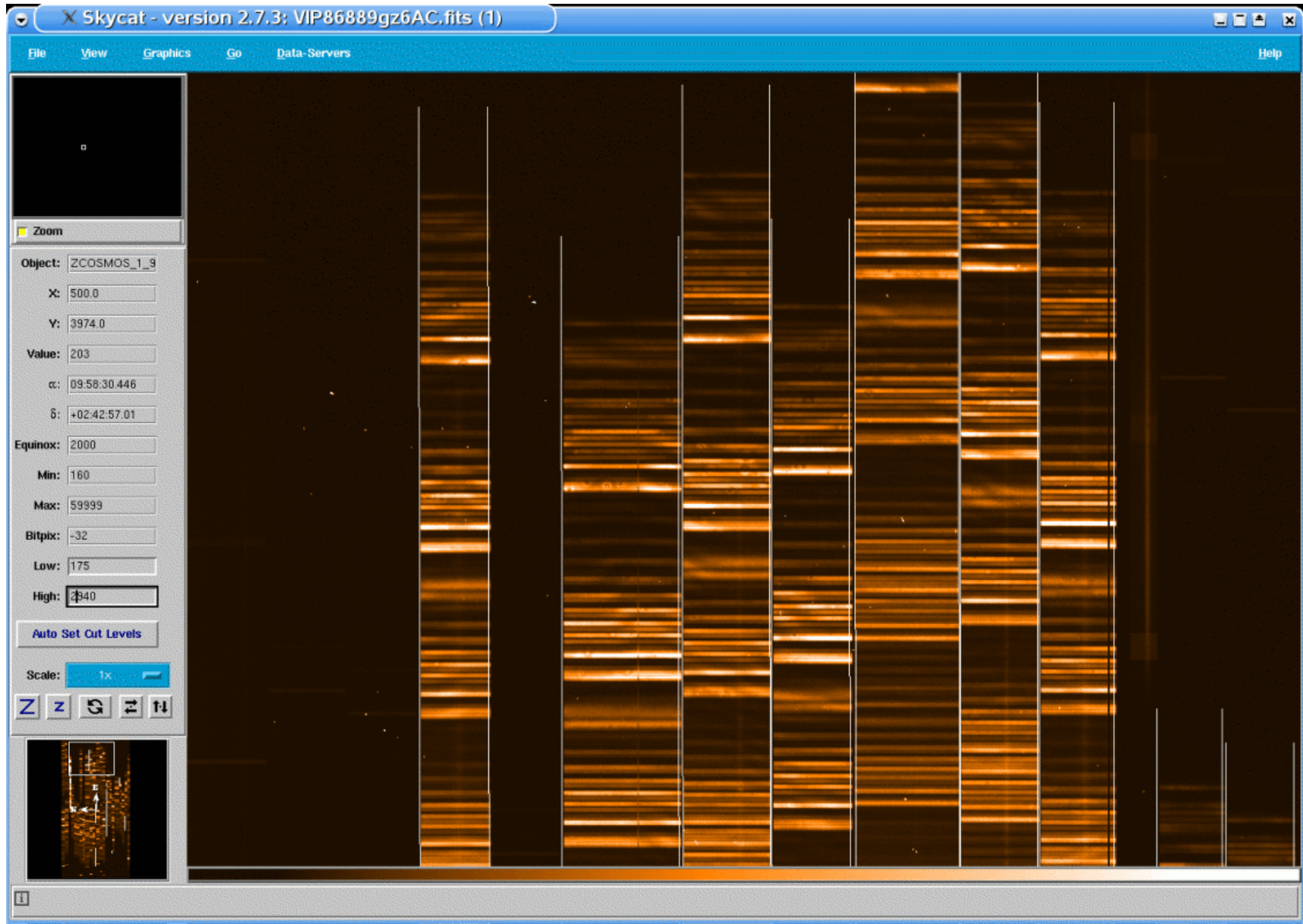
Pipeline and Instrument Calibrations: First Guesses



First Guesses: 3 mappings from the mask plane to the CCD plane

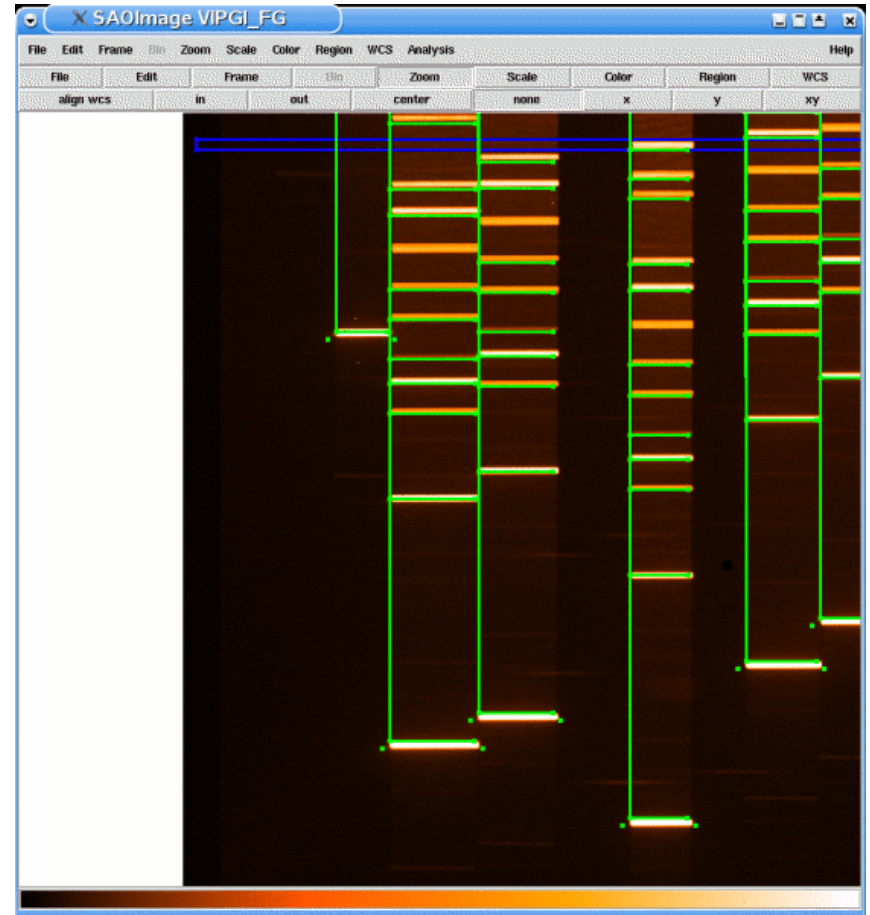
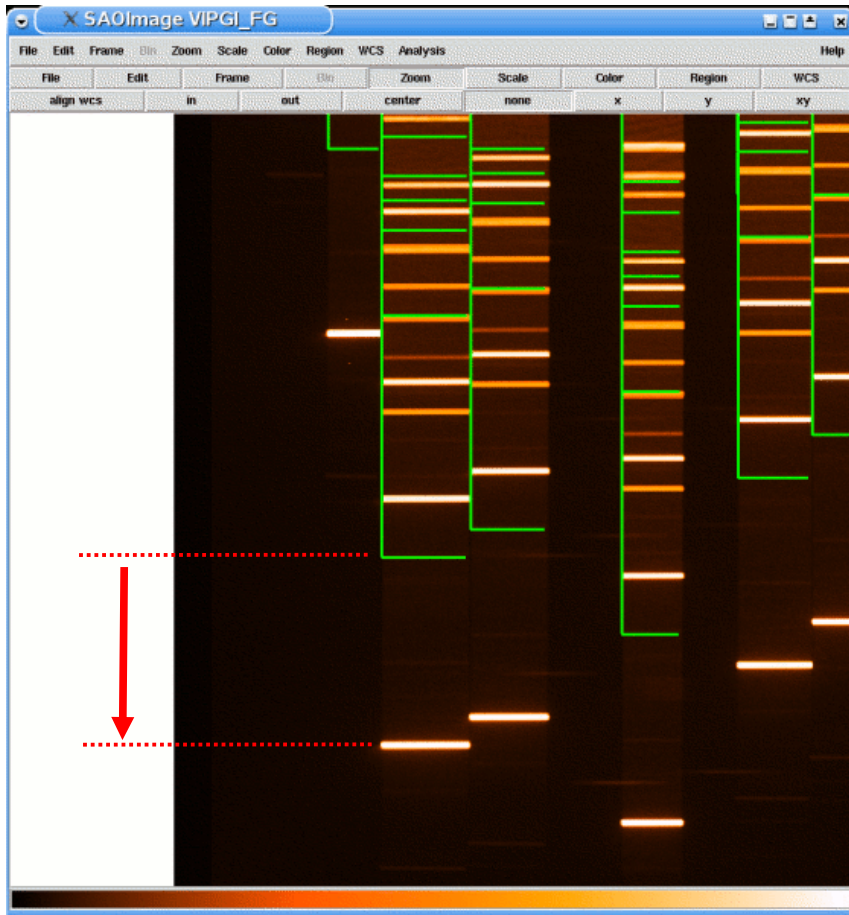


First Guesses Adjustment – Spectra Location



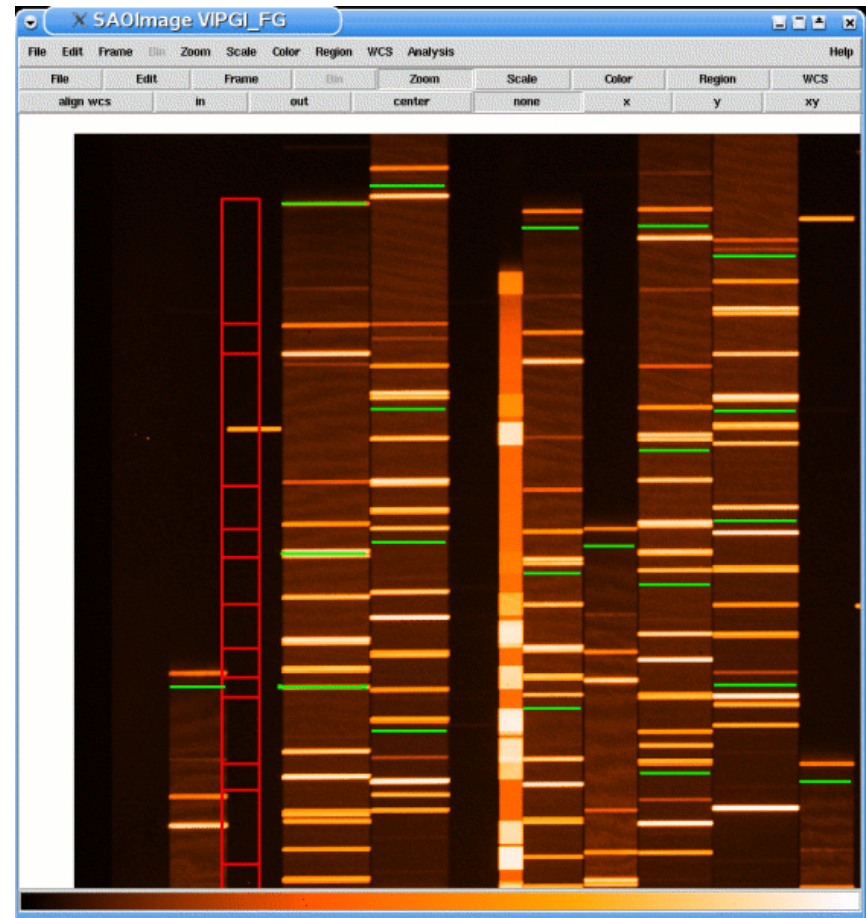
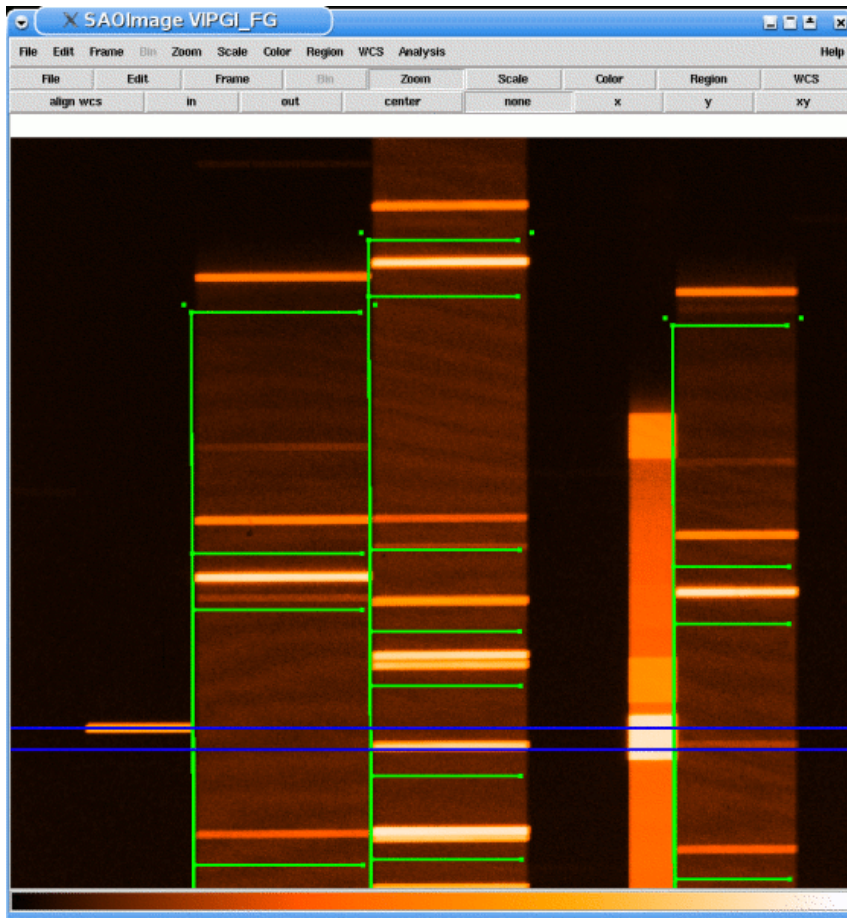
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First Guesses Adjustment – lambda cal. part 1



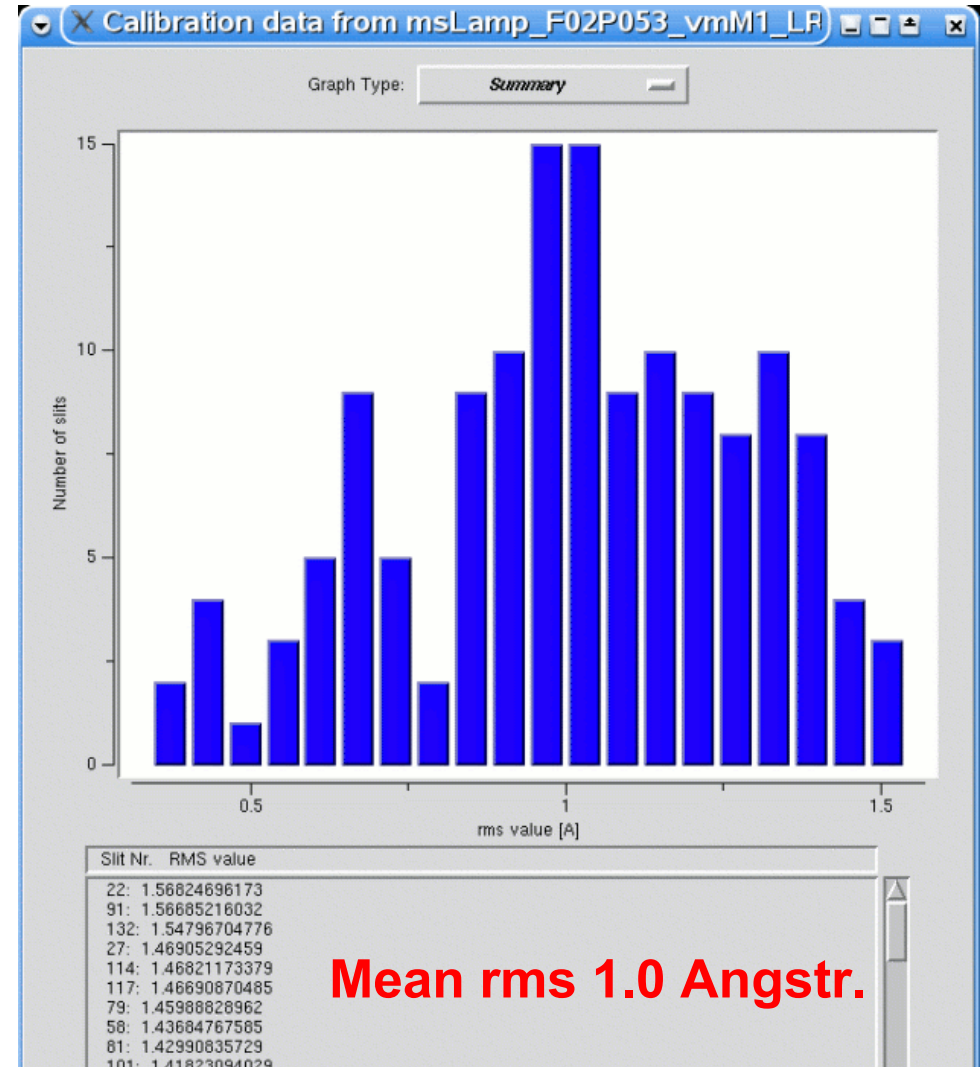
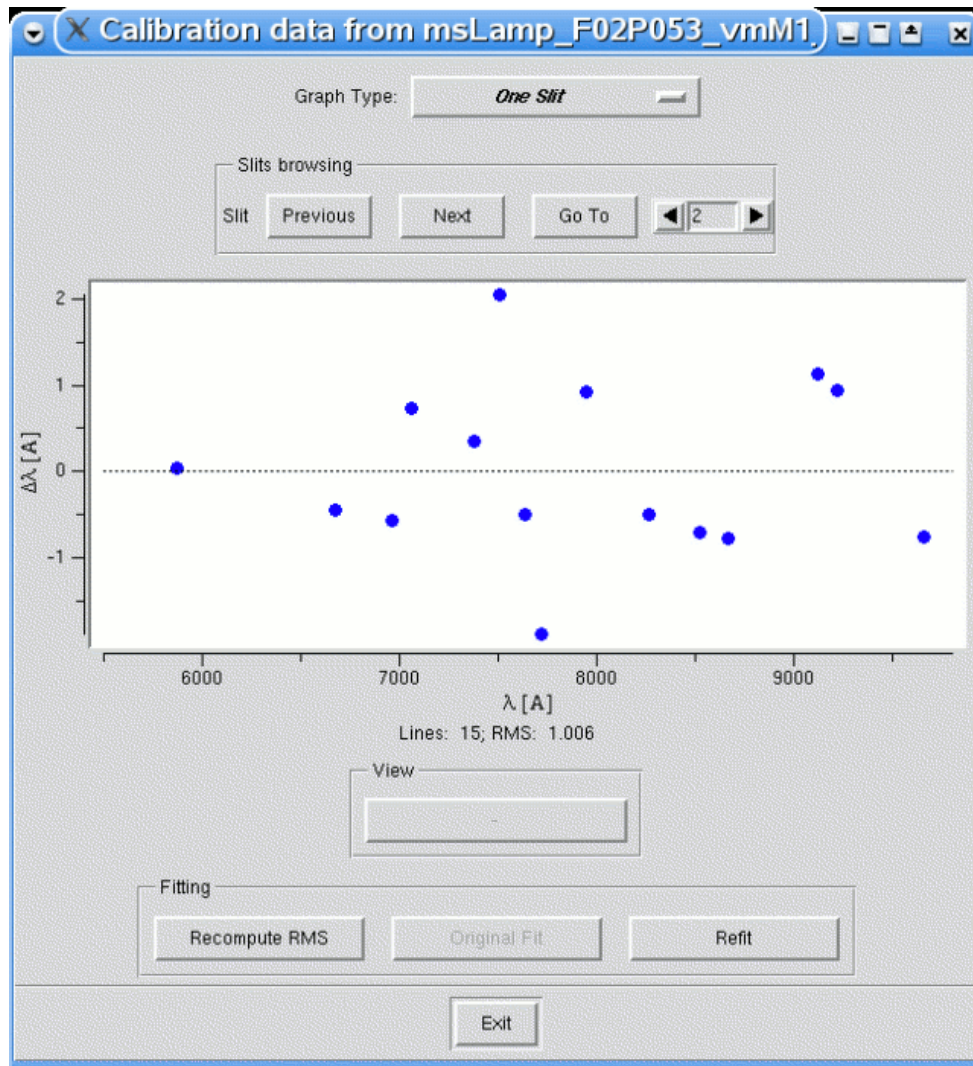
Use DS9 Regions for an interactive and very simple adjustment of First Guesses: here we see a global adjustment, which is in fact a rigid shift of the spectra location

First Guesses Adjustment – lambda cal. part 2



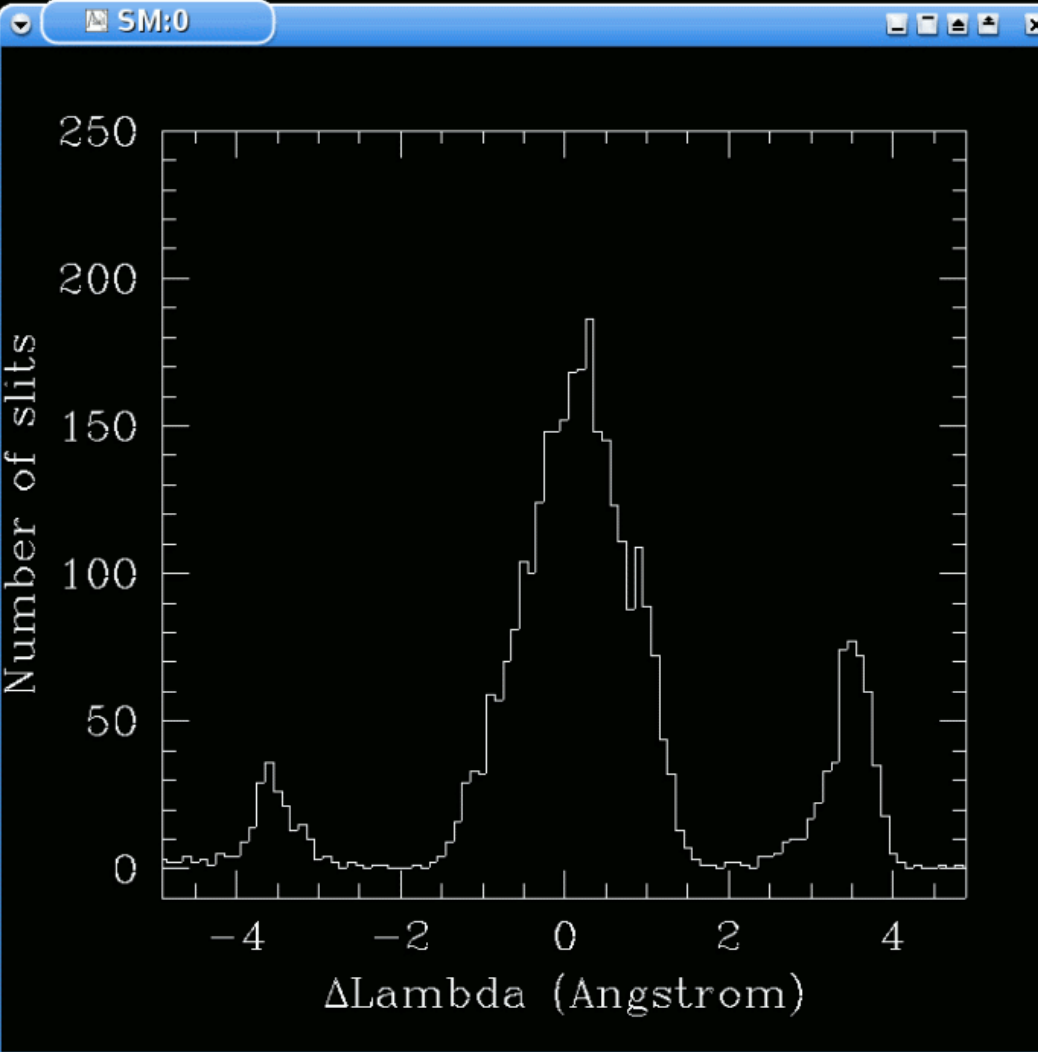
Often a global shift is not enough, and a detailed adjustment of individual slits becomes necessary: here we reposition individual arc lamp lines one by one

Lambda calibration results: the master lamp

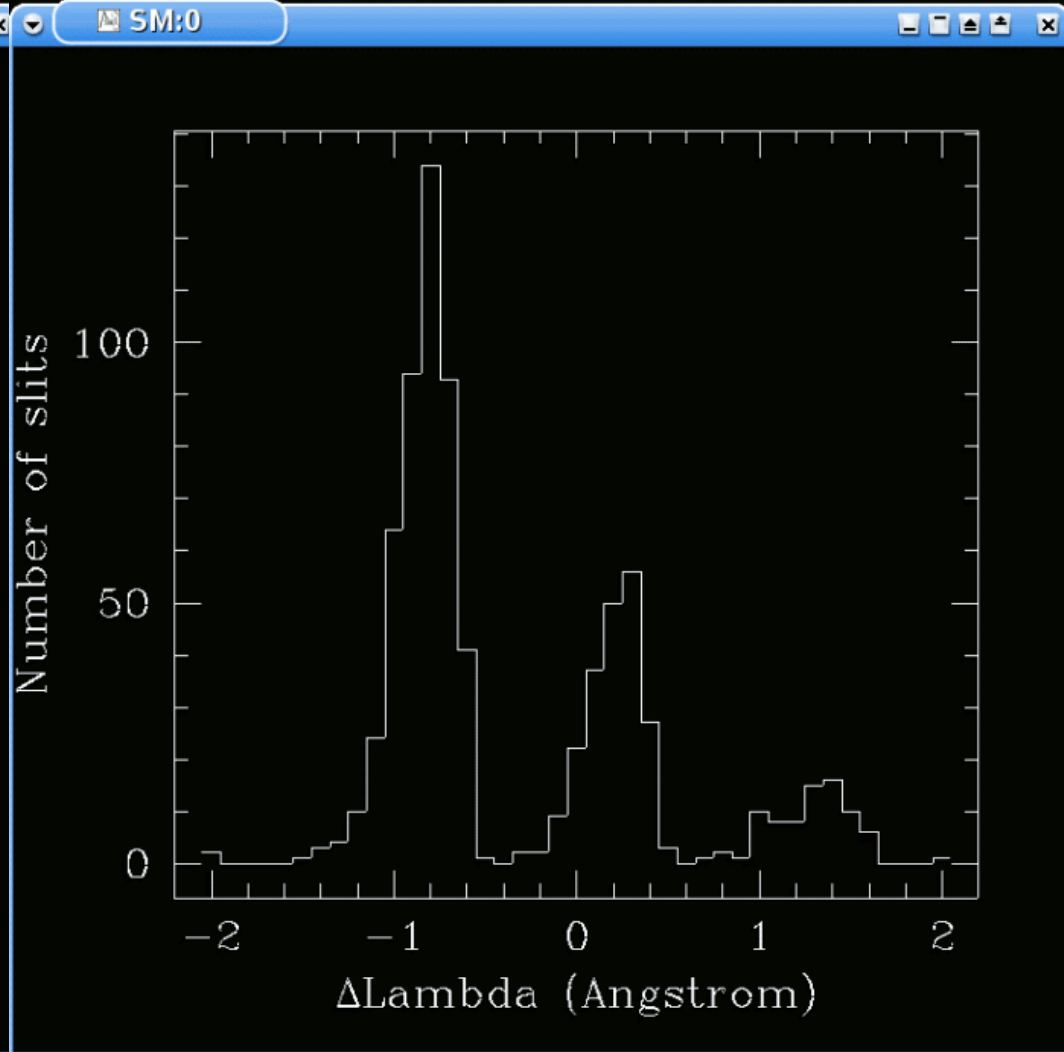


LR_red grism data: dispersion is 7.14 Angstr. / pixel

Lambda calibration results: the sky lines



LR_red: disp. 7.14 Angstr. / pixel

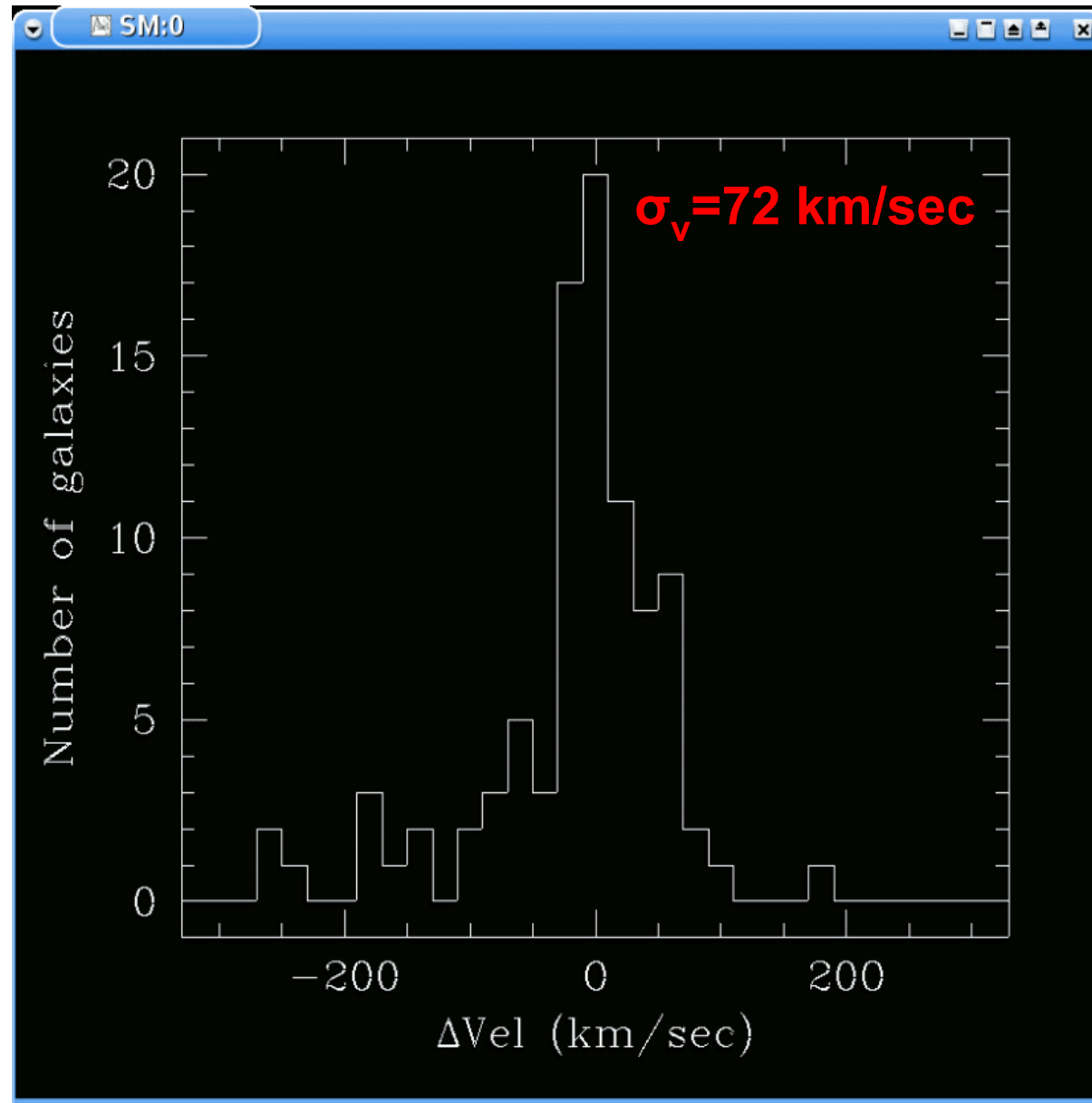


MR: disp. 2.50 Angstr. / pixel

Redshift uncertainties from repeated measurements

**MR Grism
R=580
(equivalent
to 517 km/sec)**

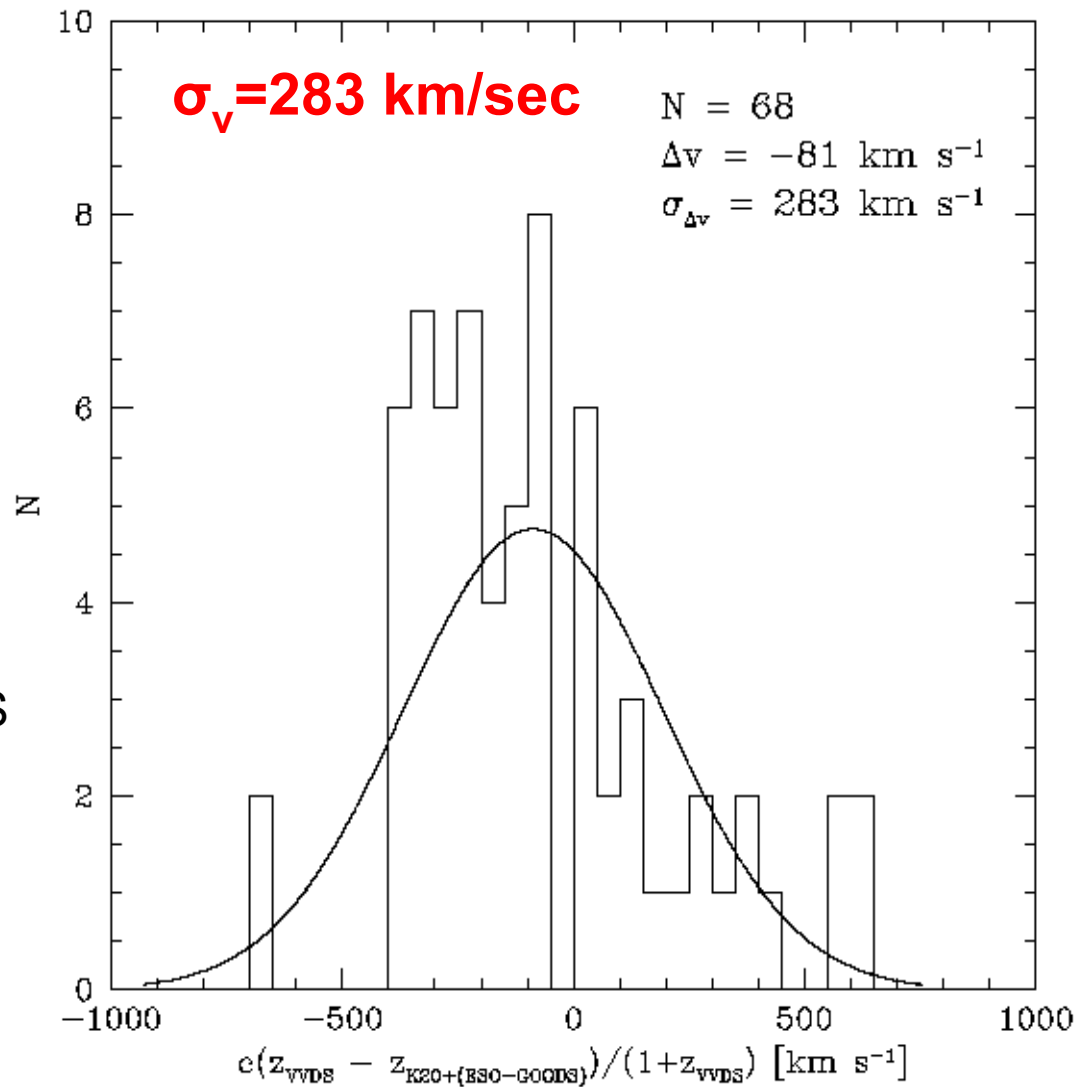
zCosmos data
one survey
pointing observed
twice



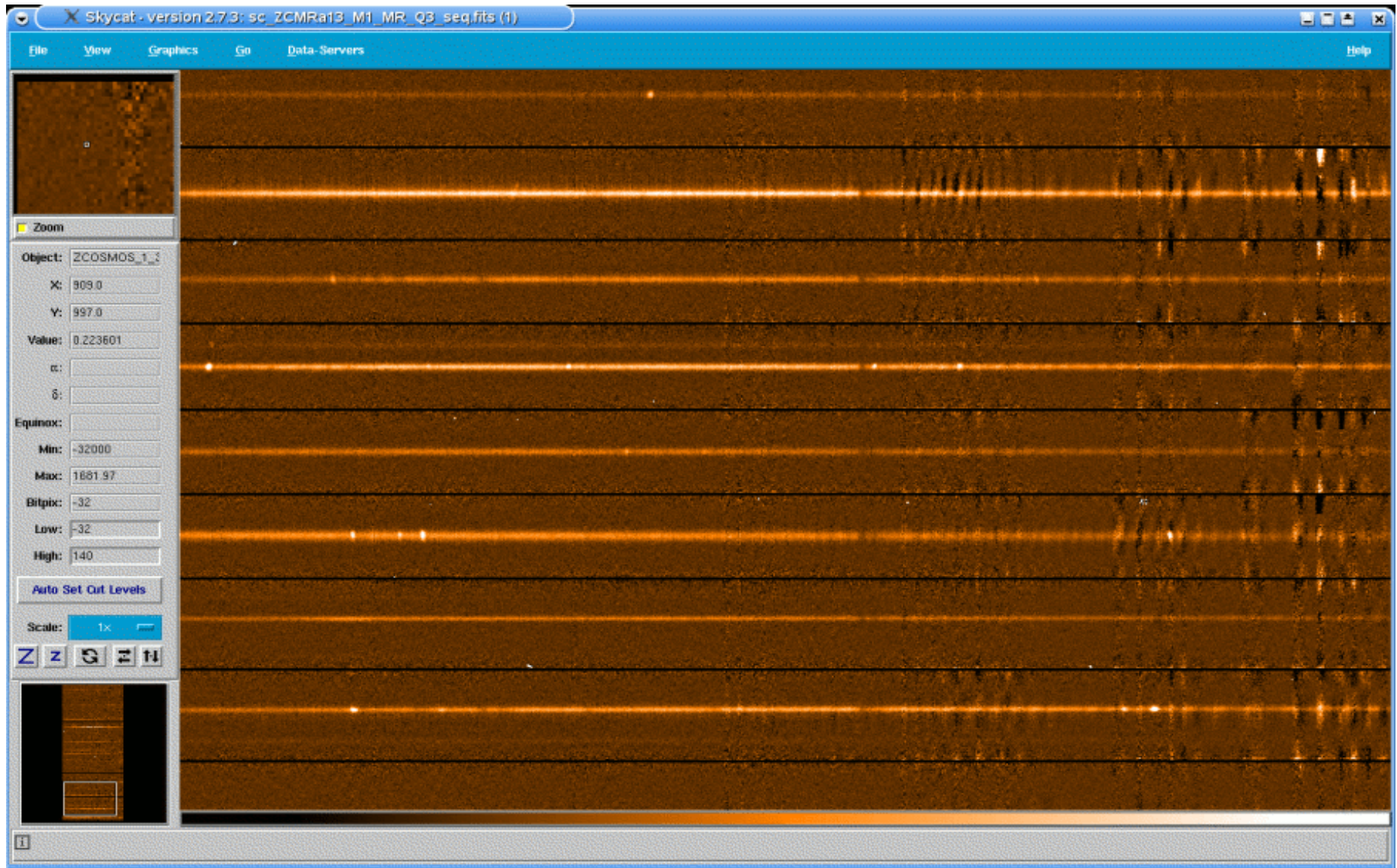
Redshift uncertainties from external comparison

LR_red Grism
R=210
(equivalent
to 1428 km/sec)

Comparison of VVDS
and GOODS data
in the HDF-South
field

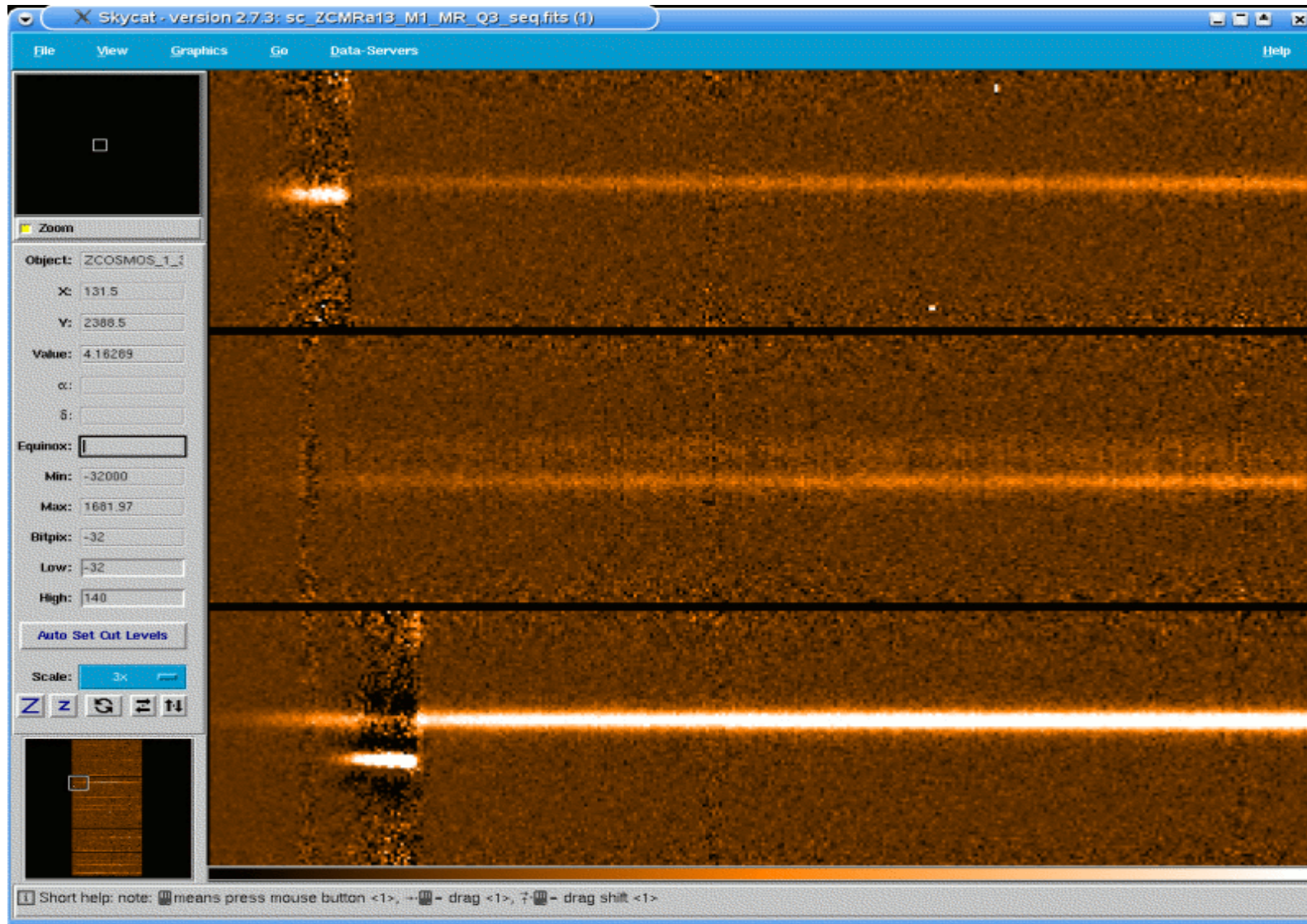


The problems: Fringing Residuals



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The problems: Zero Order Contamination



CONCLUSIONS

- lambda calibration results up to specs
- required human intervention for adjusting first guesses
- required human intervention for final refinement of lambda calibration
- we absolutely need to eliminate fringing
- we could benefit from a switch from the current many-single-slits approach to a global one-mask approach

VIPGI and other software



The screenshot shows a web browser window with the address bar displaying <http://cosmos.iasf-milano.inaf.it/pandora/vipgi.html>. The page features the PANDORA logo and the IASF logo. A navigation menu on the left includes links for Home, Software (with sub-links for ASTRODM, DBBROWSER, FITSFILE, SADIO, SGNAPS, VIPGI, and XMM-LSS), ADD-ONS, About Us, Legal Stuff, Contact Us, and Team Private. The main content area is titled "VIPGI" and "The VIMOS Interactive Pipeline Graphical Interface". It contains two sections: "What is it?" and "What does it do?".

PANDORA IASF
Where Man Wins Against The Machine

VIPGI
The VIMOS Interactive Pipeline Graphical Interface

- **What is it?**
VIPGI is the tool designed by the VIMOS Consortium to simplify to a very high degree the task of reducing spectroscopic data obtained with VIMOS, the imaging spectrograph built by the VIMOS Consortium for the European Southern Observatory. Its core reduction routines were part of the Data Reduction package delivered to ESO, while the Graphical User Interface part has been specifically designed to be used by the WDS (VIMOS VLT Deep Survey) Team.
- **What does it do?**
VIPGI provides data reduction functions optimized for (and in some cases specially dedicated to) VIMOS. It can fully reduce data taken in MOS or in IFU mode. Starting from raw frames, data will undergo all the traditional data reduction steps till the wavelength and flux calibrated 1D spectra. VIPGI can handle single exposures, but it is particularly suited for reducing and combining sequences of exposures. VIPGI is released to the community in a configuration tested on more than 20000 WDS spectra measurements, but may still need adjustments in some particular instrument modes. We will do our best to address clearly documented questions, within the context of our available resources.

<http://cosmos.iasf-milano.inaf.it/pandora>

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